USGS

**WATER RESOURCES RESEARCH GRANT PROPOSAL**

**Project ID:** 2005MN103B

**Title:** Use of Arthrobacter aurescens for Remediation of Groundwater Contaminated with Triazine Herbicides

**Project Type:** Research

**Focus Categories:** Water Quality, Groundwater, Treatment

**Keywords:** Atrazine, s-triazine, bioaugementation, Arthrobacter, biocatalysis

**Start Date:** 03/01/2005

**End Date:** 02/28/2006

**Federal Funds:** $0

**Non-Federal Matching Funds:** $23,920

**Congressional District:** 4

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**Abstract**

Modern agriculture production practices rely heavily on the use of herbicides to control weed populations. Atrazine and simazine are widely used herbicides for the control of broad-leaf weeds in corn, sorghum, sugarcane and other crops. Due to their widespread use for over 50 years, these s-triazine herbicides are often detected in ground water, sediments, and soils at levels exceeding the maximal concentrations set by the US EPA. Remediation of pollutant-impacted environments is time consuming, technically difficult, and often cost prohibitive, especially for herbicides making their way into groundwater aquifers. We have isolated and identified a gram-positive bacterium, Arthrobacter aurescens TC1 that has the ability to degrade over 25 s-triazine compounds, including the herbicides atrazine, simazine, and ametryn. In doing so, this bacterium detoxifies these herbicides thereby ridding them from the environment. The research proposed here will be done in conjunction with studies funded by the University of Minnesota Biocatalysis Initiative, which will be used to develop a stable, highly-active biocatalyst formulation

for groundwater clean-up. Initial studies done indicate that the production of such biocatalytical particles is feasible. In the studies proposed here, we will investigate the application and use of these formulated bacteria to clean-up s-triazine ring compounds in groundwater and sediments, using both batch and column-based aquifer model studies. The results of this study will also be integrated into an ongoing project with Dr. Patrick Hamilton, Director of Environmental Sciences and Earth-system Science at the Science Museum of Minnesota. His group will be making hands-on research displays demonstrating atrazine biodegradation to children for use at the Science Museum of Minnesota. The experimental plan focuses on integrating research efforts in microbial biology and engineering.